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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/711,189	Applicant(s) SIROHEY ET AL.	
	Examiner Said Broome	Art Unit 2628	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 31 August 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-50 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-50 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 19, 21-26, 43 and 45-50 rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al.(herein "Takagi", US Patent 6,269,140) in view of Claus et al.(herein "Claus" US 2005/0135558).

Regarding claim 1, Takagi teaches all the limitations except processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle. Takagi teaches a method for generating a digital image indicative of an internal anatomy of a person over a respiratory cycle in column 2 lines 61-64 ("...a method in which slice images or three-dimensional images of a object can be reconstructed by controlling the scan speed synchronously with an electrocardiogram of the object."), where the scanning is performed over the electrocardiogram signal, or any other repetitive signal including a respiratory cycle as described in column 7 lines 2-21 ("...a signal indicating a breath period of the lung is provided in place of the electrocardiograph 50, and the X-ray scan speed in the lung region is controlled synchronously with the breath period of the lung to thereby obtain a clear CT images of the lung without any distortion. Further, the present invention can be used for examination of an object having an element which is disposed inside the object and which performs periodic and repetitive

movement."). Takagi also teaches scanning the internal anatomy of the person at a plurality of positions along an axis to obtain scanning data in column 3 lines 21-26 ("...a scan control section for controlling drive of the X-ray source...to thereby perform scan on the periphery of the object with the X-rays in a direction of a sliced face crossing a body axis of the object..."), wherein the scanning at each position is performed over at least one respiratory cycle of the person, as described in column 3 lines 30-33 ("...and a scan speed control section for receiving an electrocardiogram signal of the object to thereby control a rotational speed of the rotary member on the basis of the electrocardiogram signal.") and in column 7 lines 2-21 ("...a signal indicating a breath period of the lung is provided in place of the electrocardiograph 50, and the X-ray scan speed in the lung region is controlled synchronously with the breath period of the lung to thereby obtain a clear CT images of the lung without any distortion. Further, the present invention can be used for examination of an object having an element which is disposed inside the object and which performs periodic and repetitive movement."), where it is described that the scanning is performed based on a recurring movement, such as a respiratory cycle; generating a plurality of cross-sectional digital images based on the scanning data, as described in column 3 lines 26-30 ("...an image reconstituting section for generating a slice image signal of the object on the basis of an output signal of the X-ray detector obtained during the scan..."); generating a plurality of cross-sectional digital image groups, each group comprising at least two digital images of the plurality of cross-sectional digital images wherein each of the two digital images indicate the internal anatomy at a substantially similar respiratory state, as described in column 6 lines 55-58 ("...to establish a synchronizing relation of phase between the CT scan (rotation of the rotary disc) and the cardiac pulsation to thereby obtain a plurality of CT images

corresponding to one and the same phase of pulsation."), where it is described that a plurality of images are generated for the pulsation, where each respiratory pulsation is known to include two phases: an inspiration and expiration; generating a plurality of 3-D digital images, wherein each digital image of the plurality of 3-D digital images is determined from a corresponding one of the plurality of cross-sectional digital image groups, as described in column 6 lines 60-63 ("...a three-dimensional image or a sagittal (coronal) reconstituted image is formed from a plurality of CT images obtained by scan synchronously with the period of the electrocardiographic complex..."). Again, Takagi fails to teach processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle. Claus teaches processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person, as described in paragraph lines ("Once reconstructed, the images produced by the system of FIG. 1 reveal an internal region of interest of the patient 18 which may be used for diagnosis, evaluation, and so forth."), during at least the respiratory cycle, as described in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time...For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained. An instance where this might be desired is in cardiac angiography, where it may be desirable to maintain a reconstructed volume for different cardiac states or phases, as determined from the electrocardiogram signal)."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi with Claus because this combination would provide three-dimensional digital images of internal anatomy as taught by Takagi, that are generated indicating

a particular region within the anatomy that is synchronized to the respiratory cycle of the subject under analysis, as taught by Claus, thereby decreasing image distortion.

Regarding claims 19 and 43, Takagi teaches that the plurality of cross-sectional digital images comprises a plurality of computerized tomography images in column 4 lines 25-27 ("…a CT image generating section 23 for forming three-dimensional image information from a series of tomographic image data…").

Regarding claims 21 and 45, Takagi teaches the plurality of 3-D digital images comprises a plurality of 3-D computerized tomography images in column 4 lines 25-27 ("…a CT image generating section 23 for forming three-dimensional image information from a series of tomographic image data…").

Regarding claims 22 and 46, Takagi teaches displaying at least a portion of the resultant 3-D digital image on a display monitor in column 1 lines 54-59 ("There is also such a CT apparatus in which a three-dimensional image generating section is provided (between the image information adding section 22 and the display circuit section 24) in the data processing section so that three-dimensional information is extracted from a series of CT images to thereby display three-dimensional CT images."), and it is also illustrated in Figure 1 as element 30.

Regarding claims 23 and 47, Takagi teaches displaying a 2-D portion of the resultant 3-D digital image on a display monitor in column 5 lines 63-67 ("The data to be sent to the CT image generating section 23 is constituted by a series 300 of several scan sets composed of two-dimensional data (cross-sectional data)…"), and as is illustrated in Figure 3.

Regarding claims 24 and 48, Takagi fails to teach the limitations. Claus teaches color coding a portion of the resultant 3-D digital image, and displaying the color-coded resultant 3-D

digital image on a display monitor in paragraph 0053 lines 1-16 ("The reconstructed three-dimensional image may be displayed by a volume rendering technique on a display 42 and may be viewed from any direction of interest... The display 42 may be a multi-color display or a gray-scale display that allows the use of color or gray-scale intensity, respectively, to differentiate bone and soft tissue, or contrast agent and soft tissue, or the current fluoroscopic image from the volume rendering."). The motivation to combine the teachings of Takagi and Claus is equivalent to the motivation of claim 1.

Regarding claims 25 and 49, Takagi fails to teach the limitations. Claus teaches displaying the resultant 3-D digital image on a display monitor using a volume rendering technique in paragraph 0053 lines 1-2 ("The reconstructed three-dimensional image may be displayed by a volume rendering technique on a display 42..."). The motivation to combine the teachings of Takagi and Claus is equivalent to the motivation of claim 1.

Regarding claim 26, Takagi teaches all the limitations except processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle. Takagi teaches a system for generating a digital image indicative of an internal anatomy of a person over a respiratory cycle in column 3 lines 34-50 ("...an image generating method by using an X-ray computerized tomography apparatus... receiving an electrocardiogram signal of the object and controlling a scan speed of the X-rays synchronously with a period of the electrocardiogram signal..."). Takagi teaches a respiratory monitoring device generating a first signal indicative of a respiratory state of the person in column 7 lines 2-21 ("...a device for outputting a signal indicating a breath period of the lung is provided...Further, the present invention can be used for

examination of an object having an element which is disposed inside the object and which performs periodic and repetitive movement."). Takagi also teaches a scanning device configured to scan an internal anatomy of the person to obtain scanning data in column 3 lines 21-26 ("...a scan control section for controlling drive of the X-ray source and the rotary member so that the rotary member rotates to thereby perform scan on the periphery of the object with the X-rays in a direction of a sliced face crossing a body axis of the object..."). Takagi illustrates a computer 20 operably coupled to both the respiratory monitoring device 50 and the scanning device 10 in Figure 1. Takagi also teaches generating a plurality of cross-sectional digital images based on the scanning data, as described in column 3 lines 26-30 ("...an image reconstituting section for generating a slice image signal of the object on the basis of an output signal of the X-ray detector obtained during the scan..."). Takagi also teaches generating a plurality of cross-sectional digital image groups, each group comprising at least two digital images of the plurality of cross-sectional digital images wherein each of the two digital images indicate the internal anatomy at a substantially similar respiratory state, as described in column 6 lines 55-58 ("...to establish a synchronizing relation of phase between the CT scan (rotation of the rotary disc) and the cardiac pulsation to thereby obtain a plurality of CT images corresponding to one and the same phase of pulsation."). Takagi teaches generating a plurality of 3-D digital images, wherein each digital image of the plurality of 3-D digital images is determined from a corresponding one of the plurality of cross-sectional digital image groups, as described in column 6 lines 60-63 ("...a three-dimensional image or a sagittal (coronal) reconstituted image is formed from a plurality of CT images obtained by scan synchronously with the period of the electrocardiographic complex..."). Again, Takagi fails to teach processing the plurality of 3-D digital images to

obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle. Claus teaches processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained. An instance where this might be desired is in cardiac angiography, where it may be desirable to maintain a reconstructed volume for different cardiac states or phases, as determined from the electrocardiogram signal)."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi with Claus because this combination would provide three-dimensional digital images of internal anatomy as taught by Takagi, that are generated indicating a particular region within the anatomy that is synchronized to the respiratory cycle of the subject under analysis, as taught by Claus, thereby decreasing image distortion.

Regarding claim 50, Takagi teaches all the limitations except a computer storage medium having computer code encoded therein for generating a digital image indicative of an internal anatomy and processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle. Takagi illustrates an article of manufacture 10 in Figure 1. Takagi also teaches scanning the internal anatomy of the person at a plurality of positions along an axis to obtain scanning data in column 3 lines 21-26 ("...a scan control section for controlling drive

of the X-ray source…to thereby perform scan on the periphery of the object with the X-rays in a direction of a sliced face crossing a body axis of the object…"), wherein the scanning at each position is performed over at least one respiratory cycle of the person, as described in column 3 lines 30-33 ("…and a scan speed control section for receiving an electrocardiogram signal of the object to thereby control a rotational speed of the rotary member on the basis of the electrocardiogram signal.") and in column 7 lines 2-21 ("…a signal indicating a breath period of the lung is provided in place of the electrocardiograph 50, and the X-ray scan speed in the lung region is controlled synchronously with the breath period of the lung to thereby obtain a clear CT images of the lung without any distortion. Further, the present invention can be used for examination of an object having an element which is disposed inside the object and which performs periodic and repetitive movement."), where it is described that the scanning is performed based on a recurring movement, such as a respiratory cycle, which is performed on a computerized apparatus, as described in column 3 lines 5-6 ("…an X-ray computerized tomography apparatus…") and is therefore executed using some instructions or program code. Takagi illustrates a computer 20 operably coupled to both the respiratory monitoring device 50 and the scanning device 10 in Figure 1. Takagi also teaches generating a plurality of cross-sectional digital images based on the scanning data, as described in column 3 lines 26-30 ("…an image reconstituting section for generating a slice image signal of the object on the basis of an output signal of the X-ray detector obtained during the scan…"). Takagi also teaches generating a plurality of cross-sectional digital image groups, each group comprising at least two digital images of the plurality of cross-sectional digital images wherein each of the two digital images indicate the internal anatomy at a substantially similar respiratory state, as described in column 6

lines 55-58 ("...to establish a synchronizing relation of phase between the CT scan (rotation of the rotary disc) and the cardiac pulsation to thereby obtain a plurality of CT images corresponding to one and the same phase of pulsation."). Takagi teaches generating a plurality of 3-D digital images, wherein each digital image of the plurality of 3-D digital images is determined from a corresponding one of the plurality of cross-sectional digital image groups, as described in column 6 lines 60-63 ("...a three-dimensional image or a sagittal (coronal) reconstituted image is formed from a plurality of CT images obtained by scan synchronously with the period of the electrocardiographic complex..."). Again, Takagi fails to teach a computer storage medium having computer code encoded therein for generating a digital image indicative of an internal anatomy and processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle. Claus teaches a computer storage medium having computer code encoded therein, as described in paragraph 0015 lines 1-13 (" The computer 36 may comprise or communicate with memory circuitry that can store data processed by the computer 36 or data to be processed by the computer 36... The memory circuitry may store data, processing parameters, and/or computer programs comprising one or more routines for performing the processes described herein."), for generating a digital image indicative of an internal anatomy, as described in paragraph 0051 lines 1-10 ("...reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained. An instance where this might be desired is in cardiac angiography, where it may be desirable to maintain a reconstructed volume for different cardiac states or phases, as determined from the electrocardiogram signal)..."), therefore the scanning and image generation is performed using

the computer code stored on the computer storage medium. Claus teaches processing the plurality of 3-D digital images to obtain a resultant 3-D digital image indicating positions of at least a portion of the internal anatomy of the person during at least the respiratory cycle in paragraph 0051 lines 1-10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained. An instance where this might be desired is in cardiac angiography, where it may be desirable to maintain a reconstructed volume for different cardiac states or phases, as determined from the electrocardiogram signal)."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi with Claus because this combination would provide a computer system to generate three-dimensional digital images of internal anatomy as taught by Takagi, that are generated indicating a particular region within the anatomy that is synchronized to the respiratory cycle of the subject under analysis, as taught by Claus, thereby decreasing image distortion.

Claims 2, 4, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi in view of Claus in further view of Brandl et al. (herein "Brandl", US Patent 6,450,962).

Regarding claims 2 and 27, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained.").

However, Takagi and Claus fail to teach perform a minimum intensity projection of the plurality of 3D digital images to obtain the resultant 3D digital image. Brandl teaches performing a minimum intensity projection of 3D images in column 4 lines 63-67-column 5 lines 1-9 ("The volume rendering algorithms used in accordance with certain embodiments of the present invention to combine adjacent image planes 34 include the following general types: maximum intensity projection, minimum intensity projection…"). Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus and Brandl because this combination would provide a processed plurality of 3D minimum intensity projection images produced by Brandl, to obtain the resultant 3D digital image, as taught by Claus.

Regarding claims 4 and 29, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("…more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). However, Takagi and Claus fail to teach perform a maximum intensity projection of the plurality of 3D digital images to obtain the resultant 3D digital image. Brandl teaches performing a maximum intensity projection of 3D images in column 4 lines 63-67-column 5 lines 1-9 ("The volume rendering algorithms used in accordance with certain embodiments of the present invention to combine adjacent image planes 34 include the following general types: maximum intensity projection, minimum intensity projection…"). Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus and Brandl because this

combination would provide a processed plurality of 3D maximum intensity projection images produced by Brandl, to obtain the resultant 3D digital image, as taught by Claus.

Claims 3, 5, 7-16, 28, 30 and 32-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi in view of Claus, in further view of Brandl and in further view of Yao et al.(herein "Yao", US 2005/0078858).

Regarding claims 3 and 28, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). Takagi, Claus and Brandl fail to teach that the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor. Yao teaches the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor in paragraph 0016 lines ("...a variety of feature characteristics can be computed, which can be used to classify the feature as of interest (for example, a polyp) or not of interest (for example, normal tissue).") and in paragraph 0082 lines 1-6 ("...enhancing can alter component intensities to better distinguish between features of interest and features not of interest."), wherein each of the first plurality of voxel intensity values are greater than each of the second plurality of voxel intensity

values, as described in paragraph 0168 lines 1-6 ("The intensity of a voxel is increased (for example by adjustment(v) shown Equation (8)) if it is in a potential polyp region; otherwise the intensity is decreased. Such an approach can enhance intensities to better distinguish features of interest and features not of interest."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus, Brandl and Yao because this combination would provide an accurate display of regions of interest within a digital image through assigning voxel intensity values to regions within the image.

Regarding claims 5 and 30, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). Takagi, Claus and Brandl fail to teach that the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor. Yao teaches the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor in paragraph 0016 lines ("...a variety of feature characteristics can be computed, which can be used to classify the feature as of interest (for example, a polyp) or not of interest (for example, normal tissue).") and in paragraph 0082 lines 1-6 ("...enhancing can alter component intensities to better distinguish between features of interest and features not of interest."), wherein each of the first

plurality of voxel intensity values are greater than each of the second plurality of voxel intensity values, as described in paragraph 0168 lines 1-6 ("The intensity of a voxel is increased (for example by adjustment(v) shown Equation (8)) if it is in a potential polyp region; otherwise the intensity is decreased. Such an approach can enhance intensities to better distinguish features of interest and features not of interest."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus, Brandl and Yao because this combination would provide an accurate display of regions of interest within a digital image through assigning voxel intensity values to regions within the image.

Regarding claims 7 and 32, Takagi fails to teach the limitations. Claus teaches combining one or more 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1-10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). However, Takagi and Claus fail to teach generating a maximum intensity projection to obtain a first 3D digital image, generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person and a minimum intensity projection to obtain a second 3D digital image. Brandl teaches generating a maximum intensity projection to obtain a first 3D digital image and a minimum intensity projection to obtain a second 3D digital image in column 4 lines 63-67-column 5 lines 1-9 ("The volume rendering algorithms used in accordance with certain embodiments of the present invention to combine adjacent image planes 34 include the following general types: maximum intensity projection, minimum intensity projection...Combination of rendering algorithms can be applied in the volume rendering

processor 46."), where it is described that 3D images, such as element 16 of Figure 2, may be generated using maximum and minimum intensity projections. However, Takagi, Claus and Brandl fail to teach generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person. Yao teaches generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person in paragraph 0011 lines 1-5 ("...an anatomical structure can be processed to determine an enclosing three-dimensional boundary of features...polyp boundaries in a virtual colon can be determined by software."), paragraph 0074 lines 1-9 ("...identification of features of interest in an anatomical structure...performing computer-aided detection of polyps in a CT scan of the colon, identifying boundary characteristics of polyps...") and in paragraph 0076 lines 1-6 ("A feature of interest includes any feature occurring in an anatomical structure that is of interest. In practice, features of interest can include those features that require further review by a human reviewer. For example, features of interest can include cancerous or pre-cancerous growths, lesions, polyps, and the like."), where it is described that the portion or region of interest, such as an organ, contains a boundary and is predetermined or indicated by a user. Therefore, It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus, Brandl and Yao because this combination would provide the ability to combine two 3D digital images, one of a maximum intensity projection, the second of a minimum intensity projection, that would provide a volumetric representation of the both the lower intensity region not of interest and the high intensity region of interest.

Regarding claims 8 and 33, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10

("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). Takagi, Claus and Brandl fail to teach that the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor. Yao teaches the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor in paragraph 0016 lines ("...a variety of feature characteristics can be computed, which can be used to classify the feature as of interest (for example, a polyp) or not of interest (for example, normal tissue).") and in paragraph 0082 lines 1-6 ("...enhancing can alter component intensities to better distinguish between features of interest and features not of interest."), wherein each of the first plurality of voxel intensity values are greater than each of the second plurality of voxel intensity values, as described in paragraph 0168 lines 1-6 ("The intensity of a voxel is increased (for example by adjustment(v) shown Equation (8)) if it is in a potential polyp region; otherwise the intensity is decreased. Such an approach can enhance intensities to better distinguish features of interest and features not of interest."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 5.

Regarding claims 9 and 34, Takagi fails to teach the limitations. Claus teaches color coding a portion of the resultant 3-D digital image, and displaying the color-coded resultant 3-D digital image on a display monitor in paragraph 0053 lines 1-16 ("The reconstructed three-

dimensional image may be displayed by a volume rendering technique on a display 42 and may be viewed from any direction of interest... The display 42 may be a multi-color display or a gray-scale display that allows the use of color or gray-scale intensity, respectively, to differentiate bone and soft tissue, or contrast agent and soft tissue, or the current fluoroscopic image from the volume rendering."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 5.

Regarding claims 10 and 35, Takagi fails to teach the limitations. Claus teaches displaying the resultant 3-D digital image on a display monitor using a volume rendering technique in paragraph 0053 lines 1-2 ("The reconstructed three-dimensional image may be displayed by a volume rendering technique on a display 42..."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 7.

Regarding claims 11 and 36, Takagi fails to teach the limitations. Claus teaches storing the resultant 3-D digital image in a memory in paragraph 0015 lines 1-3 ("The computer 36 may comprise or communicate with memory circuitry that can store data processed by the computer 36 or data to be processed by the computer 36."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 7.

Regarding claim 12, Takagi fails to teach the limitations. Claus teaches combining one or more 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). However, Takagi and Claus fail to teach generating a maximum intensity projection to obtain a

first 3D digital image, generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person and a minimum intensity projection to obtain a second 3D digital image. Brandl teaches generating a maximum intensity projection to obtain a first 3D digital image and a minimum intensity projection to obtain a second 3D digital image in column 4 lines 63-67-column 5 lines 1-9 ("The volume rendering algorithms used in accordance with certain embodiments of the present invention to combine adjacent image planes 34 include the following general types: maximum intensity projection, minimum intensity projection...Combination of rendering algorithms can be applied in the volume rendering processor 46."), where it is described that 3D images, such as element 16 of Figure 2, may be generated using maximum and minimum intensity projections. However, Takagi, Claus and Brandl fail to teach generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person. Yao teaches generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person in paragraph 0011 lines 1-5 ("...an anatomical structure can be processed to determine an enclosing three-dimensional boundary of features...polyp boundaries in a virtual colon can be determined by software."), paragraph 0074 lines 1-9 ("...identification of features of interest in an anatomical structure...performing computer-aided detection of polyps in a CT scan of the colon, identifying boundary characteristics of polyps...") and in paragraph 0076 lines 1-6 ("A feature of interest includes any feature occurring in an anatomical structure that is of interest. In practice, features of interest can include those features that require further review by a human reviewer. For example, features of interest can include cancerous or pre-cancerous growths, lesions, polyps, and the like."), where it is described that the portion or region of interest, such as

an organ, contains a boundary and is predetermined or indicated by a user. Therefore, It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus, Brandl and Yao because this combination would provide the ability to combine two 3D digital images, one of a maximum intensity projection, the second of a minimum intensity projection, that would provide a volumetric representation of the both lower intensity region not of interest and high intensity region of interest.

Regarding claims 13 and 38, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). Takagi, Claus and Brandl fail to teach that the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor. Yao teaches the resultant 3D digital image comprises a first region having a first plurality of voxel intensity values indicative of a tumor and a second region having a second plurality of voxel intensity values indicative of the internal anatomy surrounding the tumor in paragraph 0016 lines ("...a variety of feature characteristics can be computed, which can be used to classify the feature as of interest (for example, a polyp) or not of interest (for example, normal tissue).") and in paragraph 0082 lines 1-6 ("...enhancing can alter component intensities to better distinguish between features of interest and features not of interest."), wherein each of the first plurality of voxel intensity values are greater than each of the second plurality of voxel intensity

values, as described in paragraph 0168 lines 1-6 ("The intensity of a voxel is increased (for example by adjustment(v) shown Equation (8)) if it is in a potential polyp region; otherwise the intensity is decreased. Such an approach can enhance intensities to better distinguish features of interest and features not of interest."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 5.

Regarding claims 14 and 39, Takagi fails to teach the limitations. Claus teaches color coding a portion of the resultant 3-D digital image, and displaying the color-coded resultant 3-D digital image on a display monitor in paragraph 0053 lines 1-16 ("The reconstructed three-dimensional image may be displayed by a volume rendering technique on a display 42 and may be viewed from any direction of interest... The display 42 may be a multi-color display or a gray-scale display that allows the use of color or gray-scale intensity, respectively, to differentiate bone and soft tissue, or contrast agent and soft tissue, or the current fluoroscopic image from the volume rendering."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 5.

Regarding claims 15 and 40, Takagi fails to teach the limitations. Claus teaches displaying the resultant 3-D digital image on a display monitor using a volume rendering technique in paragraph 0053 lines 1-2 ("The reconstructed three-dimensional image may be displayed by a volume rendering technique on a display 42..."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 5.

Regarding claims 16 and 41, Takagi fails to teach the limitations. Claus teaches storing the resultant 3-D digital image in a memory in paragraph 0015 lines 1-3 ("The computer 36 may comprise or communicate with memory circuitry that can store data processed by the computer

36 or data to be processed by the computer 36.") and in paragraph 0005 lines 1-7 ("...a method is provided for generating a three-dimensional image...At least one three-dimensional image may be reconstructed..."). The motivation to combine the teachings of Takagi, Claus, Brandl and Yao is equivalent to the motivation of claim 5.

Regarding claim 37, Takagi fails to teach the limitations. Claus teaches combining one or more 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10 ("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). However, Takagi and Claus fail to teach generating a maximum intensity projection to obtain a first 3D digital image, generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person and a minimum intensity projection to obtain a second 3D digital image. Brandl teaches generating a maximum intensity projection to obtain a first 3D digital image and a minimum intensity projection to obtain a second 3D digital image in column 4 lines 63-67-column 5 lines 1-9 ("The volume rendering algorithms used in accordance with certain embodiments of the present invention to combine adjacent image planes 34 include the following general types: maximum intensity projection, minimum intensity projection...Combination of rendering algorithms can be applied in the volume rendering processor 46."), where it is described that 3D images, such as element 16 of Figure 2, may be generated using maximum and minimum intensity projections. However, Takagi, Claus and Brandl fail to teach generating a boundary within the first 3D digital image around a predetermined portion of the internal anatomy of the person. Yao teaches generating a boundary

within the first 3D digital image around a predetermined portion of the internal anatomy of the person in paragraph 0011 lines 1-5 ("...an anatomical structure can be processed to determine an enclosing three-dimensional boundary of features...polyp boundaries in a virtual colon can be determined by software."), paragraph 0074 lines 1-9 ("...identification of features of interest in an anatomical structure...performing computer-aided detection of polyps in a CT scan of the colon, identifying boundary characteristics of polyps...") and in paragraph 0076 lines 1-6 ("A feature of interest includes any feature occurring in an anatomical structure that is of interest. In practice, features of interest can include those features that require further review by a human reviewer. For example, features of interest can include cancerous or pre-cancerous growths, lesions, polyps, and the like."), where it is described that the portion or region of interest, such as an organ, contains a boundary and is predetermined or indicated by a user. Therefore, It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus, Brandl and Yao because this combination would provide the ability to combine two 3D digital images, one of a maximum intensity projection, the second of a minimum intensity projection, that would provide a volumetric representation of the both lower intensity region not of interest and high intensity region of interest.

Claims 6 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi in view of Claus in further view of Caoili et al. (herein "Caoili", "Urinary Tract Abnormalities: Initial Experience with Multi–Detector Row CT Urography").

Regarding claims 6 and 31, Takagi fails to teach the limitations. Claus teaches processing several 3D digital images to obtain a resultant 3D digital image in paragraph 0051 lines 1- 10

("...more than one reconstructed data set or volume may present at one time. Indeed, several reconstructed datasets can co-exist if desired. For example, reconstructed volumes corresponding to different "states" of the imaged anatomy may be concurrently maintained."). However, Takagi and Claus fail to teach perform an average intensity projection of the plurality of 3D digital images to obtain the resultant 3D digital image. Caoili teaches performing an average intensity projection of 3D images on page 354 second column second paragraph lines 9-22 ("The 3D reconstructions in coronal and bilateral 25° coronal oblique projections were created with...average intensity projection (AIP), and volume-rendering algorithms...Curves for the volume-rendered images were chosen to preferentially show enhanced soft tissue and contrast-opacified structures."). Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus and Caoili because this combination would provide a processed plurality of 3D average intensity projection images produced by Caoili, to obtain the resultant 3D digital image, as taught by Claus.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi in view of Claus, in further view of Yanof et al. (herein "Yanof", US 2003/0188757).

Regarding claim 17, Takagi and Claus fail to teach the limitations. Yanof teaches scanning the internal anatomy of the person comprises monitoring a position on a chest of the person during respiration by the person to determine the time period of the respiratory cycle of the person in paragraph 0035 lines 1-9 ("The respiratory monitor system 12 includes a respiratory sensor 20 preferably formed as a belt 22 adapted for attachment around the abdomen or chest of a patient...the respiratory sensor 20 includes an air bellows sensor and pressure

transducer (not shown) for generating a signal corresponding to the displacement of a patient's abdomen during respiration."), and as shown in Figure 1 as element 22. It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus and Yanof because this combination would provide accurate monitoring of the respiratory cycle of a person.

Claims 18, 20, 42 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi in view of Claus, in further view of Yao.

Regarding claims 18 and 42, Takagi and Claus fail to teach the limitations. Yao teaches at least a portion of the internal anatomy of the person comprises a tumor, or cancerous growth, in paragraph 0076 lines 1-6 ("In practice, features of interest can include those features that require further review by a human reviewer. For example, features of interest can include cancerous or pre-cancerous growths, lesions, polyps, and the like."). It would have been obvious to one of ordinary skill in the art to combine the teachings of Takagi, Claus and Yao because this combination would provide a user with the capability to visualize three-dimensional images of particular regions of analysis, specifically regions of cancerous growths, such as tumors.

Regarding claims 20 and 44, Takagi, Claus and Brandl fail to teach the limitations. Yao teaches the plurality of cross-sectional digital images comprises a plurality of magnetic resonance images in paragraph 0087 lines 1-6 ("Imaging includes any techniques for obtaining an image of the inside of a body...Imaging includes...magnetic fields (such as MRI)."). The motivation to combine the teachings of Takagi, Claus, Yao is equivalent to the motivation of claim 18.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The other references listed on the attached PTO-892 form are made of record because they pertain to three-dimensional computed tomography imaging.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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7/6/06

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